

WE CLAIM:

1. A disk recording and/or reproducing apparatus comprising:

5 a spindle chassis for rotationally supporting a turntable on which an optical disk, to/from which information is recorded and/or reproduced, is placed;

a pickup chassis, rotationally supported on said spindle chassis, for movably supporting an optical pickup device for writing and/or reading said
10 information to/from said optical disk and being movable toward and away from the turntable; and

a tilt mechanism for adjusting a tilt angle of said optical pickup device with respect to said optical disk by rotating said pickup chassis with respect to
15 the spindle chassis, said tilt mechanism comprising:

a stepping motor for rotating said pickup chassis with respect to said spindle chassis; and

a control circuit for driving said stepping motor to set the tilt angle at a predetermined
20 neutral position.

2. A disk recording and/or reproducing apparatus according to claim 1, wherein said control circuit drives said stepping motor to obtain a reference
25 position by causing a loss of synchronism.

3. A disk recording and/or reproducing apparatus according to claim 2, wherein said control circuit drives said stepping motor by outputting a signal
30 representing a number of steps corresponding to a tilt

angle between the predetermined neutral position and the reference position.

4. A disk recording and/or reproducing apparatus
5 according to claim 1, wherein the predetermined neutral position is indicative of a middle position between a tilt minimum position and a tilt maximum position.

5. A disk recording and/or reproducing apparatus
10 according to claim 1, wherein the predetermined neutral position is indicative of a position at which an optical disk having no warp is reproduced most preferably.

15 6. A disk recording and/or reproducing apparatus according to claim 3, wherein said control circuit includes a memory for storing the predetermined neutral position.

20 7. A disk recording and/or reproducing apparatus according to claim 2, wherein said stepping motor is assembled on said tilt mechanism in such a manner that an electrical phase of said stepping motor is coincident with a mechanical phase of said tilt
25 mechanism.

8. An apparatus for adjusting the tilt angle of an optical pickup device, comprising:
a first chassis assembly;
30 a second chassis assembly rotationally supported on said first chassis;

a tilt drive mechanism mechanically engaged with
said second chassis assembly; and

control circuitry, having no tilt sensor input,
electrically connected to said tilt drive mechanism,
5 said control circuitry outputting a control signal to
said tilt drive mechanism.

9. An apparatus for adjusting the tilt angle of an
optical pickup device according to claim 8, wherein
10 said control circuit comprises a memory storage device.

10. An apparatus for adjusting the tilt angle of
an optical pickup device according to claim 8, wherein
said tilt drive mechanism comprises:

15 a stepper motor connected to receive the control
signal output from said control circuitry.

11. An apparatus for adjusting the tilt angle of
an optical pickup device according to claim 10, wherein
20 said tilt drive mechanism further comprises:

a cam having a portion mechanically engaged with
said stepper motor, and a spiral surface mechanically
engaged with said second chassis assembly.

25 12. An apparatus for adjusting the tilt angle of
an optical pickup device according to claim 11, further
comprising:

a protrusion extending from an end of said second
chassis assembly, and located proximate said spiral
30 surface; and

a biasing device having a fixed end and a free end, said fixed end being attached to said first chassis assembly, and said free end being in contact with said protrusion, thereby continuously biasing said
5 second chassis assembly onto said spiral surface.

13. A method of adjusting the tilt angle of an optical device tilt mechanism to a predetermined neutral position, the method comprising the steps of:

10 rotating a drive unit in a first direction until the tilt mechanism reaches a predetermined reference position; and

rotating the drive unit in a second direction, opposite to the first direction, a predetermined number
15 of rotations, thereby positioning the tilt mechanism to the predetermined neutral position.

14. A method of adjusting the tilt angle of an optical device tilt mechanism according to claim 13,
20 wherein the predetermined reference position coincides with a loss of synchronism between an electrically induced magnetic field in the drive unit and a mechanical magnetic field in the drive unit.

25 15. A method of adjusting the tilt angle of an optical device tilt mechanism according to claim 13, wherein the predetermined neutral position coincides with a position halfway between a tilt mechanism minimum tilt position and a tilt mechanism maximum tilt
30 position.

16. A method of adjusting the tilt angle of an optical device tilt mechanism according to claim 13, further comprising the step of:

5 synchronizing an electrically induced magnetic field phase of the drive unit and a mechanical magnetic field phase of the drive unit, prior to rotating the drive unit in the first direction.

17. A method of adjusting the tilt angle of an optical device tilt mechanism according to claim 16, wherein said synchronizing step comprises:

 electrically energizing a portion of the drive unit; and

15 assembling the drive unit to the tilt mechanism with the tilt mechanism positioned to the predetermined reference position.

18. A method of adjusting the tilt angle of an optical device tilt mechanism according to claim 13, further comprising the steps of:

20 retrieving the predetermined neutral position from a memory device, prior to rotating the drive unit in the second direction.

25 19. A method of adjusting the tilt angle of an optical device tilt mechanism according to claim 18, further comprising the step of:

 setting the predetermined neutral position, prior to rotating the drive unit in the first direction.

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20. A method of adjusting the tilt angle of an optical device tilt mechanism according to claim 19, wherein said setting step comprises the steps of:

positioning a reference optical disk proximate the
5 optical device, said reference optical disk having no warp;

generating a read signal by reading information recorded on the reference optical disk;

setting the predetermined neutral position to
10 coincide with a predetermined level of the read signal;
and

storing the predetermined neutral position in the memory device.